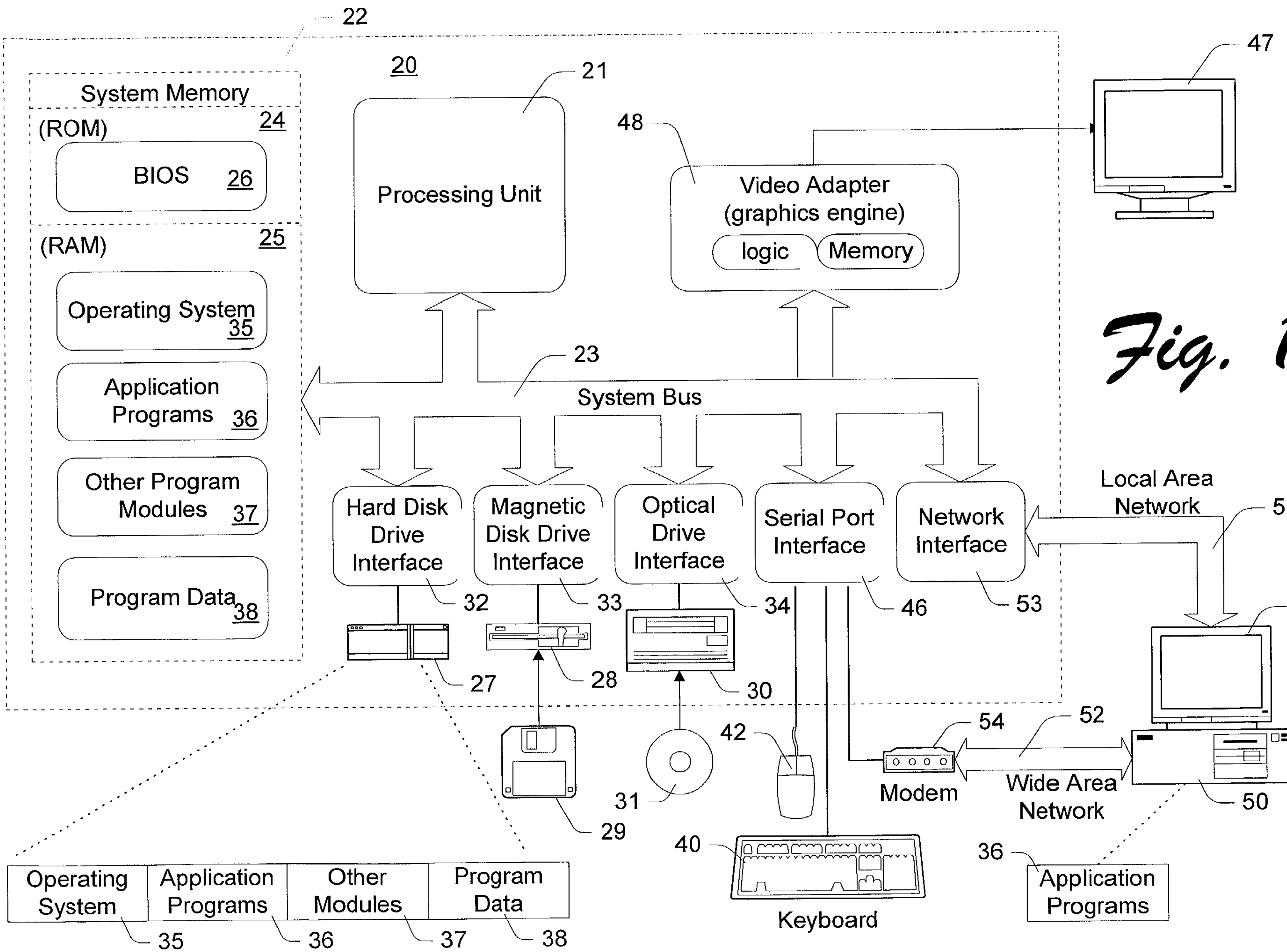
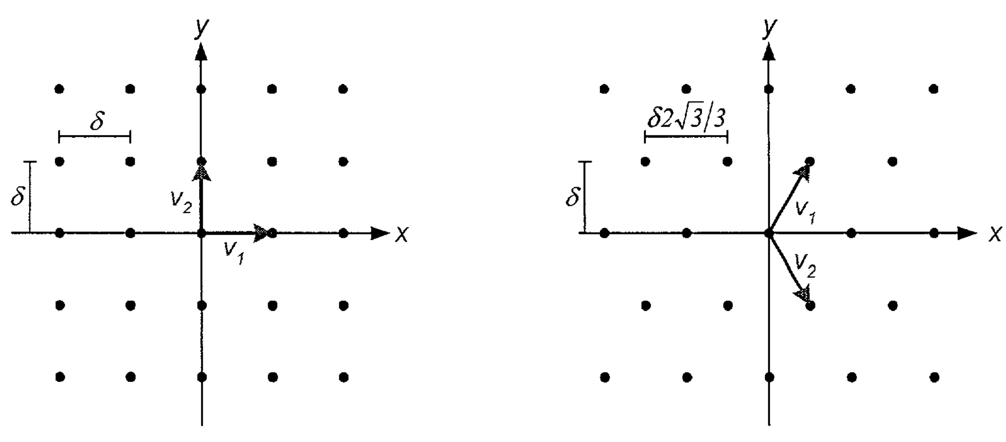

22
20
System Memory
(ROM)
24
BIOS 26
(RAM)
25
Operating System 35
Application Programs 36
Other Program Modules 37
Program Data 38
Processing Unit
21
48
Video Adapter (graphics engine)
logic
Memory
47
23
System Bus
Hard Disk Drive Interface
32
Magnetic Disk Drive Interface
33
Optical Drive Interface
34
Serial Port Interface
46
Network Interface
53
Local Area Network
51
49
27
28
30
29
31
42
54
52
Modem
Wide Area Network
50
40
Keyboard
36
Application Programs
Operating System
35
Application Programs
36
Other Modules
37
Program Data
38

Fig. 1

100

	Map name	Sampling Requirement	Minimum Isotropy	Map Components
	OpenGL	∞	0	1
102	Cube	24	0.58	6
	Dual Stereographic	32	1	2
	Lat/Long	19.7	0	1
	Dual Equidistant*	19.7	0.64	2
	Low Distortion Area Preserving*	19.7	0.29	1
104	Polar-Capped* (stretch invariant)	14.8	0.71	3
	Polar-Capped* (conformal)	16.5	1	3
	Polar-Capped* (hexagonally reparameterized)	13.5	0.58	3
106	Optimal Isometric**	12.57	1	∞
	Optimal**	10.9	0.58	∞

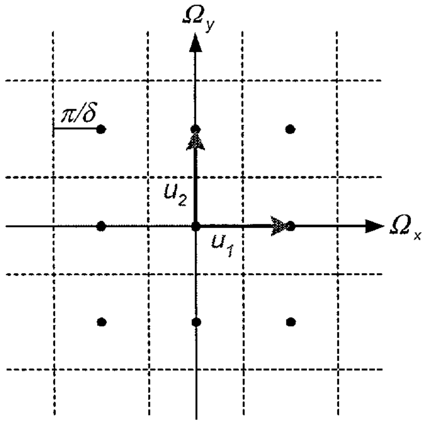
Fig. 2



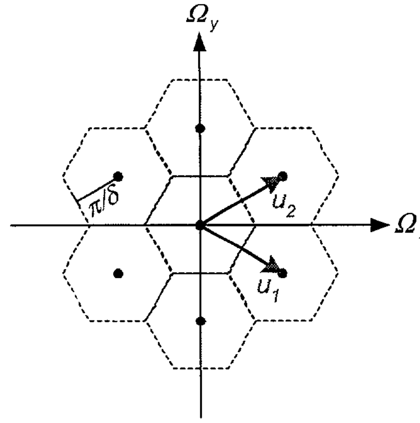
(a) rectangular

(b) hexagonal

Fig. 3



(a) rectangular



(b) hexagonal

Fig. 4

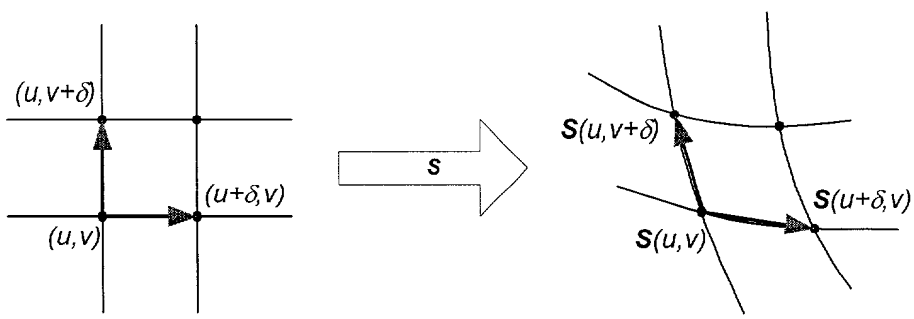


Fig. 5

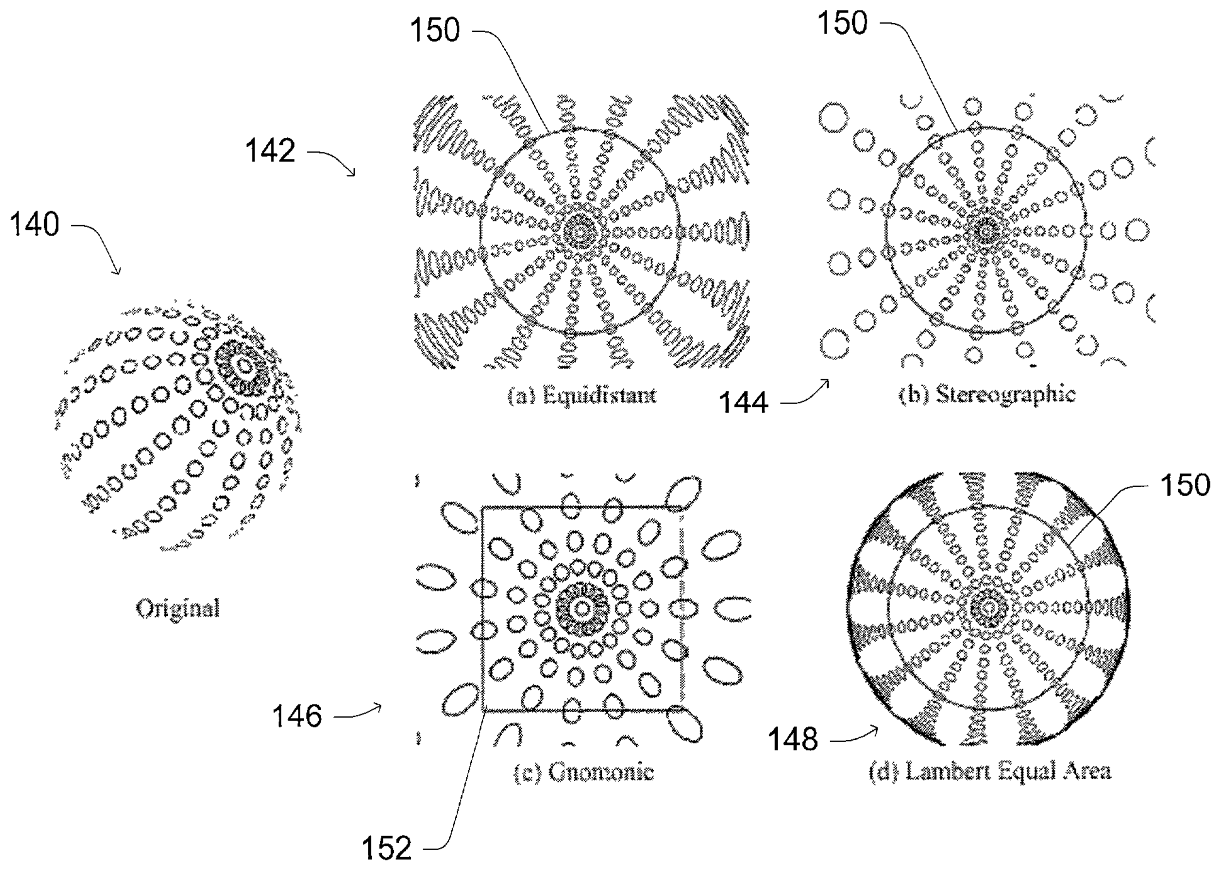
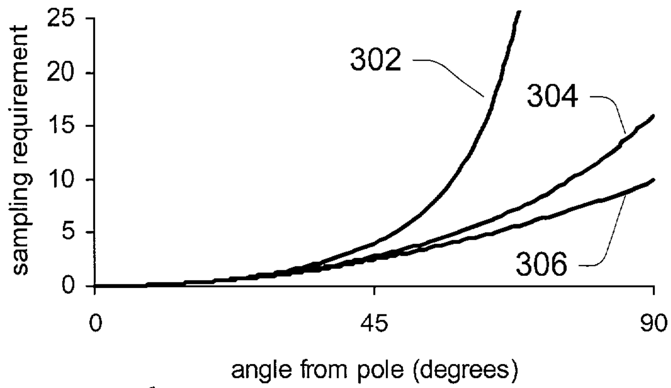

150
150
142
140
(a) Equidistant
144
(b) Stereographic
Original
150
146
(c) Gnomonic
148
(d) Lambert Equal Area
152

Fig. 6

200

	Equidistant	Gnomonic	Stereographic	Lambert Equal Area
$\theta(r)$	$(\pi/2)r$	$\cos^{-1}\left(\sqrt{1/(r^2+1)}\right)$	$\cos^{-1}\left((1-r^2)/(1+r^2)\right)$	$\cos^{-1}(1-r^2)$
properties	stretch-preserving	projects great circles to lines	conformal, projects circles to circles	area-preserving
r* covering hemisphere	$[0, 1]$	$[0, \infty]$	$[0, 1]$	$[0, 1]$
r* covering sphere	$[0, 2]$	–	$[0, \infty]$	$[0, \sqrt{2}]$
$r(\theta)$	$2\theta/\pi$	$\tan\theta$	$\tan(\theta/2)$	$\sqrt{1-\cos\theta}$
$\sin\theta$	$\sin((\pi/2)r)$	$r/\sqrt{r^2+1}$	$2r/(1+r^2)$	$r\sqrt{2-r^2}$
$\cos\theta$	$\cos((\pi/2)r)$	$\sqrt{1/(r^2+1)}$	$(1-r^2)/(1+r^2)$	$1-r^2$
$\lambda_1(\theta)$	$\pi/2$	$\cos\theta$	$1+\cos\theta$	$2/\sqrt{1+\cos\theta}$
$\lambda_2(\theta)$	$(\pi/2)\operatorname{sinc}\theta$	$\cos^2\theta$	$1+\cos\theta$	$\sqrt{1+\cos\theta}$
$\alpha(\theta)$	$\operatorname{sinc}\theta$	$\cos\theta$	1	$(1+\cos\theta)/2$
$\tau(\theta)$	$(\pi/2)^2\operatorname{sinc}\theta$	$\cos^3\theta$	$(1+\cos\theta)^2$	2
$\lambda_1^*(\theta)$	$\pi/2$	1	2	$2/\sqrt{1+\cos\theta}$
$M_S(\theta)$	$4\theta^2$	$4\tan^2\theta$	$16\tan^2(\theta/2)$	$16\tan^2(\theta/2)$
inverse map	$f=(\pi/2)\operatorname{sinc}(\cos^{-1}z)$ $u=x/f$ $v=y/f$	$u=x/z$ $v=y/z$	$u=x/(1+z)$ $v=y/(1+z)$	$u=x/\sqrt{1+z}$ $v=y/\sqrt{1+z}$

Fig. 7



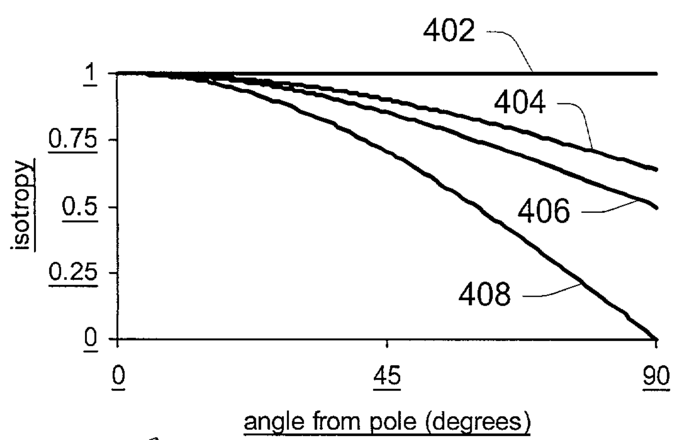
300

Fig. 8

Solid	M_S	α^*	Components
tetrahedron	41.57	0.33	4
cube	24	0.58	6
octahedron	20.78	0.58	8
dodecahedron	16.65	0.79	12
icosahedron	15.16	0.79	20

320

Fig. 9



400

Fig. 10

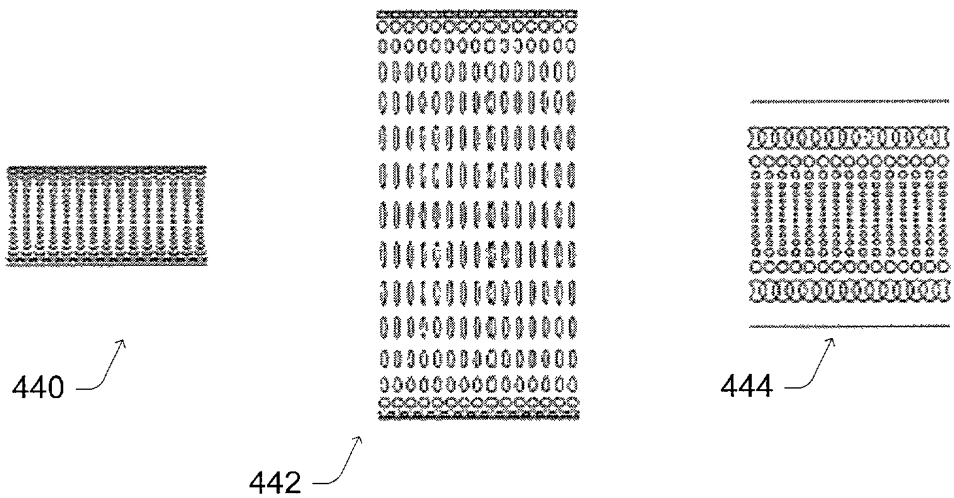


Fig. 11

500

	Plane Chart	Equal Area	Mercator
$\theta(v)$	$2\pi v$	$\sin^{-1} v$	$\sin^{-1}(\tanh(2\pi v))$
properties	stretch-preserving	area-preserving	conformal
v covering sphere	$[-1/4, 1/4]$	$[-1, 1]$	$[-\infty, \infty]$
$v(\theta)$	$\theta/(2\pi)$	$\sin\theta$	$\tanh^{-1}(\sin\theta)/(2\pi)$ $= \ln((1+\sin\theta)/(1-\sin\theta))/(2\pi)$
$\cos\theta$	$\cos(2\pi v)$	$\sqrt{1-v^2}$	$\mathrm{sech}(2\pi v)$ $= 2/(e^{-2\pi v} + e^{2\pi v})$
$\sin\theta$	$\sin(2\pi v)$	v	$\tanh(2\pi v)$ $= (e^{2\pi v} - e^{-2\pi v})/(e^{2\pi v} + e^{-2\pi v})$
$\lambda_1(\theta)$	2π	$\max(1/\cos\theta, 2\pi\cos\theta)$	$2\pi\cos\theta$
$\lambda_2(\theta)$	$2\pi\cos\theta$	$\min(1/\cos\theta, 2\pi\cos\theta)$	$2\pi\cos\theta$
$\alpha(\theta)$	$\cos\theta$	$\min(1/(2\pi\cos^2\theta), 2\pi\cos^2\theta)$	1
$\tau(\theta)$	$4\pi^2\cos\theta$	2π	$4\pi^2\cos^2\theta$
$\lambda_1^*(\theta)$	2π	$\max(1/\cos\theta, 2\pi)$	2π
$M_S(\theta)$	$2\pi\theta$	$\max(1/\cos^2\theta, 4\pi^2)\sin\theta$	$2\pi\tanh^{-1}(\sin\theta)$ $= \pi\ln((1+\sin\theta)/(1-\sin\theta))$
inverse map	$u = (\mathrm{atan2}(y,x))/(2\pi)$ $v = (\sin^{-1} z)/(2\pi)$	$u = (\mathrm{atan2}(y,x))/(2\pi)$ $v = z$	$u = (\mathrm{atan2}(y,x))/(2\pi)$ $v = \tanh^{-1} z/(2\pi)$ $= \ln((1+z)/(1-z))/(4\pi)$

Fig. 12

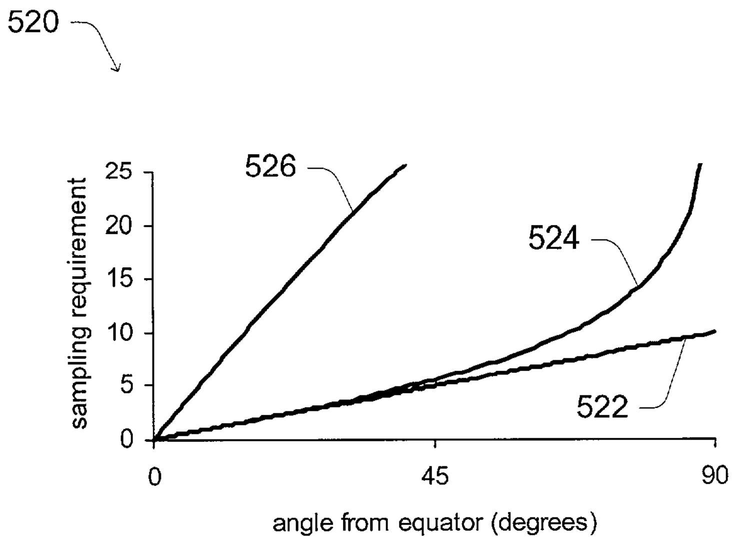

520
526
524
522
sampling requirement
25
20
15
10
5
0
0
45
90
angle from equator (degrees)

Fig. 13

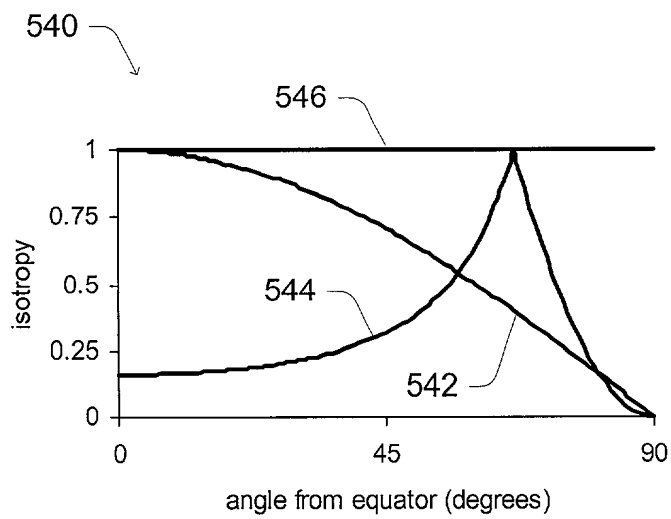

540
546
544
542
isotropy
1
0.75
0.5
0.25
0
0
45
90
angle from equator (degrees)

Fig. 14

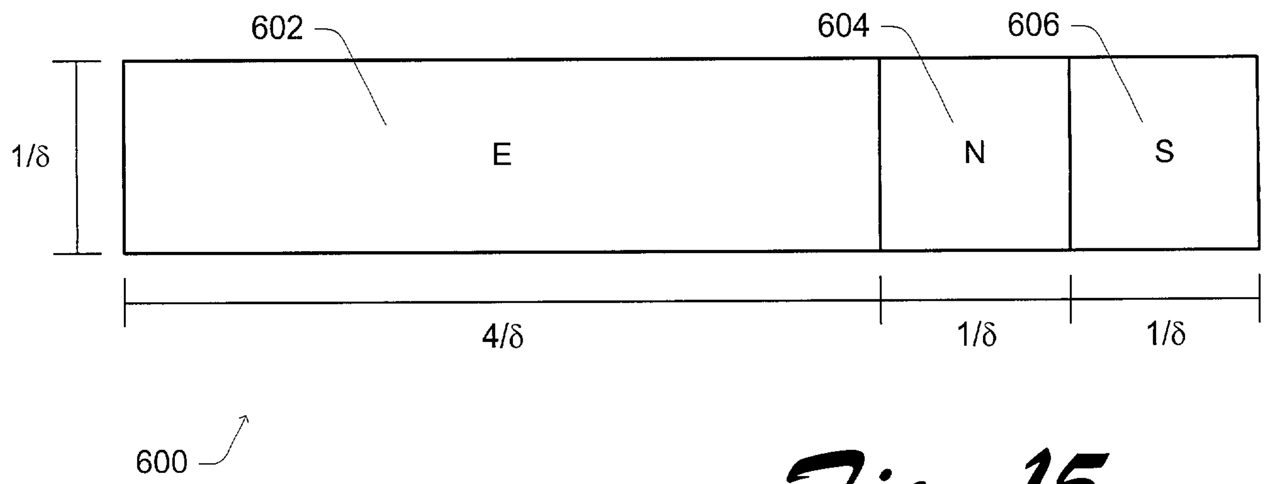
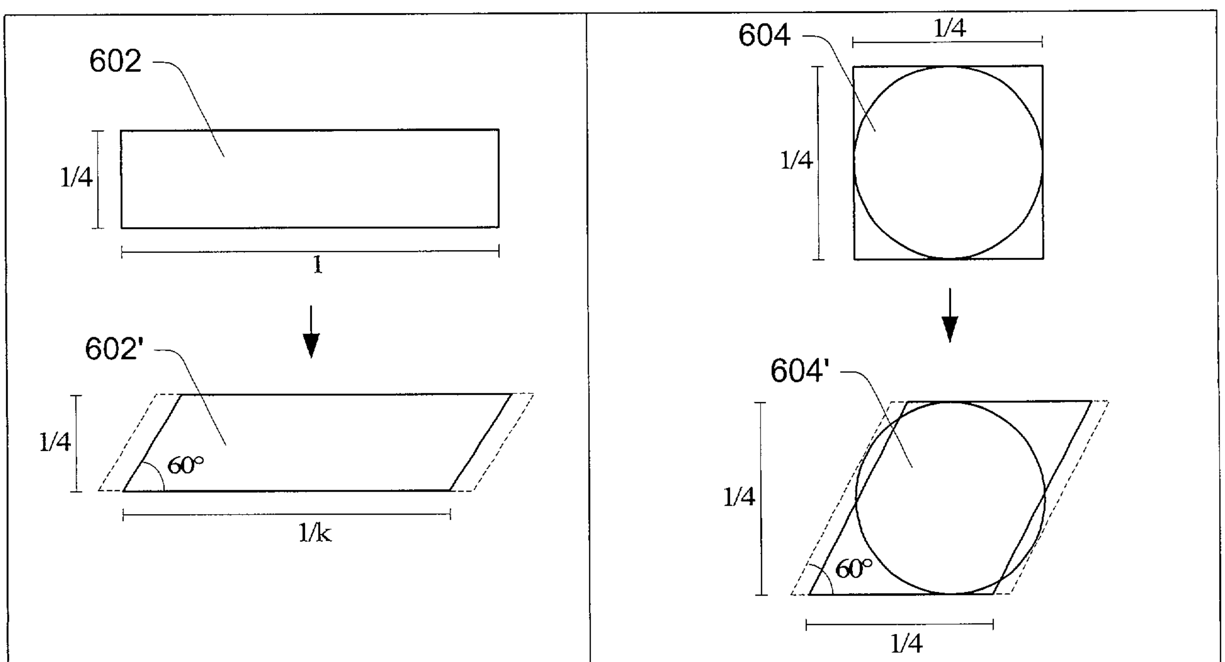


Fig. 15



(a) reparameterized equatorial domain

(b) reparameterized polar domain

Fig. 16

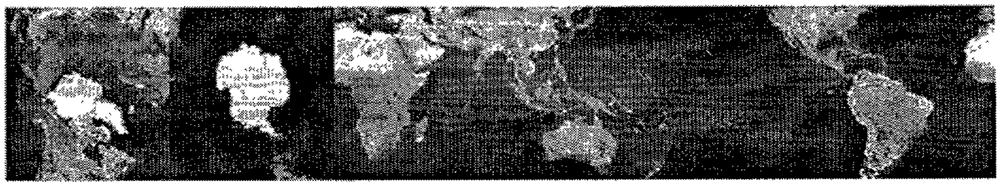


Fig. 17

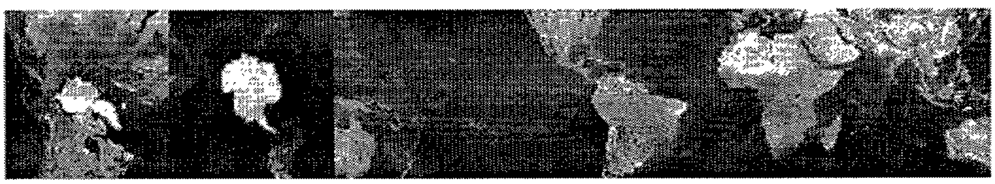


Fig. 18

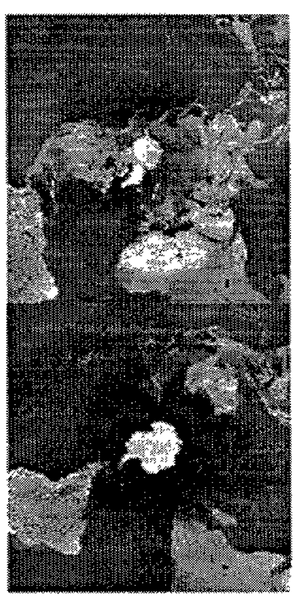


Fig. 19

Fig. 20

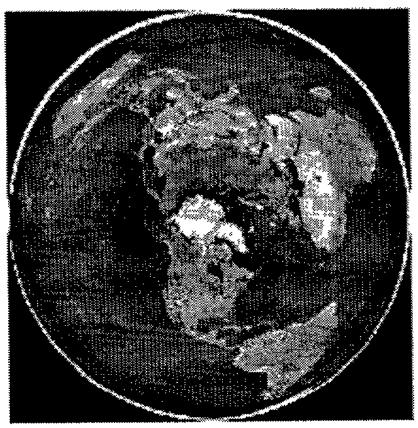


Fig. 21

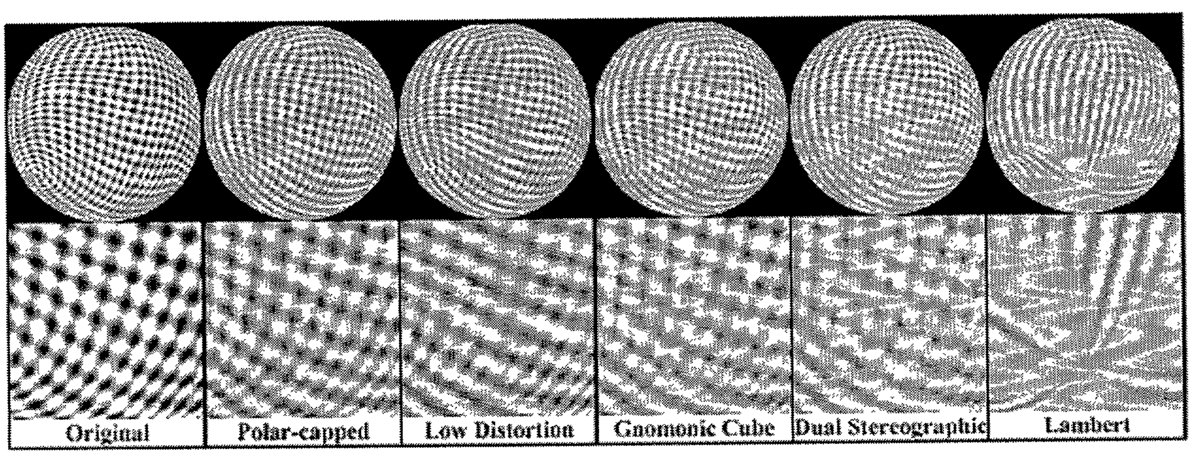


Fig. 22

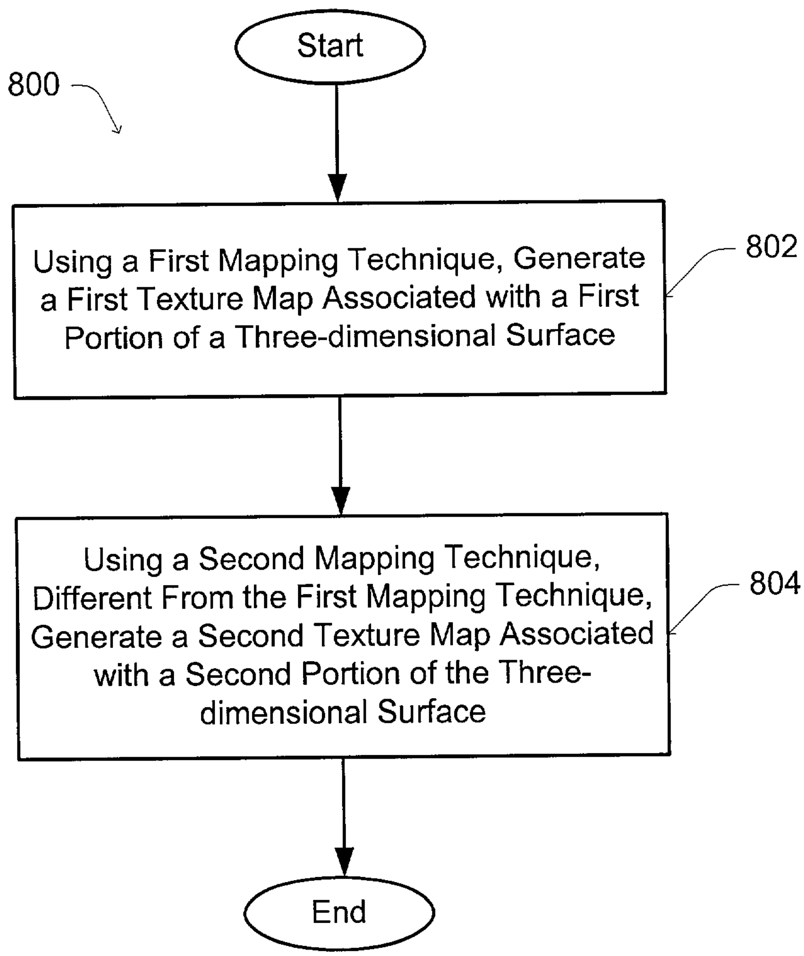

Start
800
Using a First Mapping Technique, Generate a First Texture Map Associated with a First Portion of a Three-dimensional Surface
802
Using a Second Mapping Technique, Different From the First Mapping Technique, Generate a Second Texture Map Associated with a Second Portion of the Three-dimensional Surface
804
End

Fig. 23